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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P.O.Box 1450, Alexandria, Virginia 22313-1450 on December 8, 2004.

Signed: Maureen Golob
Maureen Golob

SUBSTITUTE SPECIFICATION

Mail Stop Amendment
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Alexandria, VA 22313-1450

Dear Sir:

Before a re-examination on the merits of the claims, please enter the following substitute specification that is located at Appendix A of this paper.

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BRAKING BUFFER AND TURNING BALANCE DEVICE FOR MOTORCAR

BACKGROUND OF THE INVENTION

Field of the invention

The present invention relates to a mechanical braking buffer and a turning balance device. In particular, the present invention relates to implementing momentum transfer, which transfers the temporary momentum to a weighty drum. These mechanical devices increase the comfort and safety of a car.

Description of the Related Art

Generally the improvement of the braking system of a car such as Anti-lock Brake System (ABS), which prevents slipping cause by locking of the wheel, increases safety by preventing the steering wheel from going out of control. However, this anti-lock brake system is electrical and as a result its sensing system has its limitations. ABS provides little contribution to decreasing braking distance. For the improvement of the safety during turning a differential gear makes different rotation rates for the left wheel and the right wheel, and makes turning smoother. Other improvements such as a soft seat and seat belts also increase the safety and comfort of passengers. However, all of these can not decrease the uncomfort and danger caused by push and centrifugal force during braking and turning.

What is needed is an improved mechanical device that can satisfy the need for comfort and safety such that the uncomfortable feeling caused by the push when braking and unbalanced caused by the centrifugal force during turning can be decreased, and stability, comfort, safety can all be increased. There is also a need to employ a less accurate, and therefore less expensive, method to manufacture the device.

OBJECTS OF THE INVENTION

It is therefore an object of the invention to provide an improved braking buffer device for a motorcar. The device will transfer the temporary momentum to a weighty drum when braking, this will decrease the pushed feeling of the driver and the passenger, increasing comfort when braking.

It is another object of the invention to provide an improved braking buffer device for a motorcar. This is accomplished by implementing a simple mechanical device to decrease braking distance, and increase safety when braking.

It is yet another object of the invention to provide an improved turning balance device for a motorcar. The device will transfer the momentum of the outward temporary centrifugal force to a weighty drum when the car is turning, thus increasing comfort.

It is yet a further object of the invention to provide an improved turning balance device for a motorcar. The device will decrease the radius of turning by decreasing the outward centrifugal force of the front wheel, and decrease the wear on the tires, thus increasing the safety of the driver and the passengers.

DISCLOSURE OF THE INVENTION

A first aspect of the present invention teaches a braking buffer device for a motorcar, installing one braking buffer device at the left side and another one at the right side under the body of a car, by transferring the temporary momentum to a weighty drum when braking to decrease the braking distance, increasing the comfort and safety of the car, every device comprising: A supporting frame, fixed longitudinally under the body of a car between the front wheel and the rear wheel, to support the front and rear end plate, guiding axis, recover spring, buffer spring and weighty drum; A guiding axis, guiding the position of the weighty drum and the spring to slide forward or backward; two front and rear end plates, fixing on the two end of the supporting frame, for supporting the guiding axis; A weighty drum, sliding along the guiding axis for absorbing momentum; A recover spring, for recovering the original position of the weighty drum; A buffer spring, for buffering and noise absorption during the recovering of the recover spring; A fixing mechanism, for fixing the supporting frame on the body of a car.

Another preferred embodiment of the present invention teaches a turning balance device for a motorcar, by transferring the momentum of the temporary centrifugal force to a weighty drum when the car is turning, to decrease the centrifugal momentum of the front wheel, thus increasing safety, comprising: A supporting frame, fixed transversely under the body of a car near the trunk, to support the left and right end plate, guiding axis, recover spring and weighty drum; A guiding axis, guiding the position of the weighty drum and the spring to slide to the left or to the right; Two left and right end plates, fixing on the two end of the supporting frame, for supporting the guiding axis; A weighty drum, sliding along the guiding axis for absorbing momentum; A recover spring, for recovering the original position of the weighty drum; A fixing mechanism, for fixing the supporting frame on the body of a car.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other advantages of the invention will be more fully, understood with reference to the description of the best embodiment and the drawing wherein:

FIG. 1 is a schematic representation of the structure of a braking buffer device in according to one embodiment of the present invention.

FIG. 2 is a schematic representation of the position of the weighty drum in the instance after braking.

FIG. 3 is a schematic representation of the structure of a turning balance device in according to one embodiment of the present invention.

FIG. 4 is a schematic representation of the weighty drum slipping to the left due to the centrifugal force when the car turning to the right.

FIG.5 illustrates the example set up of two braking buffer devices and one turning balance device under the body of a car.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG.1, FIG.1 is a schematic representation of the structure of a braking buffer device 100 in according to one embodiment of the present invention. Supporting frame 102 is a hollow cylinder, or other shapes compatible with the space of installation under the car, enabled to support the momentum of the weighty drum 114 and the counter force of the spring 110, and is generally made of stainless steel or plastic. Two fitting screw holes 106 on both ends are used to fix the support frame on the body of a car. Every car generally installs two set of braking buffer 100 on the left and the right sides. Front end plate 104' and rear end plate 104 are fixed on the two sides of the supporting frame 102 to support the guiding axis 108, The weighty drum 114, the recover spring 110 and the buffer spring 112 are guided by the guiding axis 108. The recover spring releases potential energy after braking is completed, which takes the drum 114 to recover its original position. The recover spring 110 can be replaced by a pneumatic. The buffer spring 112 can also be replaced by an elastic rubber. The guiding axis goes through the sliding hole of the weighty drum such that the weighty drum can slide along it, and will slide forward along the arrow 116 by inertia during braking. Assume that the mass of the drum is m, the velocity of the car is v_1, the momentum when braking is then:

$$\text{Momentum of the weighty drum} = mv_1 \qquad (1)$$

At this time, the car is braking, the velocity of the car decreases to v_2, where $v_2<v_1$, assume that the mass of the car is M, the momentum changed is then:

$$\text{Momentum changed} = Mv_1-Mv_2 =M(v_1-v_2) \qquad (2)$$

The change of momentum makes the driver and the passengers feel a pushing, part of the momentum change to the momentum of the weighty drum, thus decreasing the push felt by the driver and the passengers. Until the braking is completed, the momentum of the weighty drum is struck against the car and changed to be part of the momentum of the car (part of the momentum changes to potential energy) through the spring and the body of the car. However, by this time, the braking is already completed and the strike is not essential to the driver and the passengers. Now the weighty drum stops on the front-end position, as shown in FIG.2. FIG. 2 is a schematic representation of the position of the weighty drum in the instance after braking. One can see in FIG.2 that the recover spring 110 is compressed and storing potential energy, but the buffer spring 112 is still in its original position because it does not connect with the weighty drum. Once the weighty drum 114 approaches the most front end of the rear end plate 104, the weighty drum 114 is pushed back to its original position by the recover spring 110, as shown in FIG.1. When the weighty drum 114 approaches the far front end of the rear end plate 104, the motorcar may still be moving forward, and braking is still in progress. The action of pushing back the weighty drum 114 to its original position by the recover spring 110 causes the weighty drum 114 to shoot off backward and touch the rear end plate 104. As a result, the motorcar receives a backward force that helps with braking such that the speed of the car decreases and less braking is required. The shape of the weighty drum is the same as the supporting frame, it may be round shaped or of other shapes to match the shape of the supporting frame, i.e. to match the shape of the installing space. It is preferable to have more mass in the weighty drum, dependent on the size of the car. In order to decrease the volume of the weighty drum, it is preferable to use lead. Additionally, stainless steel or ion could be used to decrease pollution.

Each one of the braking buffer devices for a motorcar is installed on the left and the right side. In one embodiment, the braking buffer devices are installing longitudinally and horizontally at the left side and another one at the right side under the body of a car. In another embodiment, the braking buffer devices are installed longitudinally and tilted towards the front end 1° to 4° downward at the left side and another one at the right side under the body of a car, thus the weighty drum will produce a downward component of force on the front and the rear wheel, but most of the force is applied to the front wheel, which increases the tire's grip on the ground and increases frictional force of the four wheels, thus preventing slipping of the four wheels. This also helps to decrease the braking distance. In emergency braking, the weighty drum presses downward and forward, this may decrease the possibility of turn over and increase the safety of the car, especially in turning. The weight of the weighty drum may also increase the stability of the car and thus help to prevent turnovers. Furthermore, there are two braking buffer devices installed on both sides of the car, the weigh of the braking buffer device is installed at the lowest position from the ground, thus enforcing the stability of the car when emergency braking is applied during turning, thus decreasing the possibility of turning over of the car.

FIG. 3 is a schematic representation of the structure of a turning balance device in according to one embodiment of the present invention. The turning balance device 200 is different from the braking buffer device 100 in view of the weighty drum 214. The weighted drum 214 is put in the central position of the turning device 200, and there are recover springs 210 and 212 on either side, supporting frame 202 is fixed transversely on the rear part of the body under the trunk or in the rear bumper. A larger distance from the front axis of the wheel to the weighty drum 214 produces better results. Left end plate 204' and right end plate 204 are fixed on the two sides of the supporting frame 202 to support the guiding axis 208, The weighty drum 214, recover spring 210 and 212. The guiding axis 208 goes through the sliding hole of the weighty drum 214 such that the weighty drum 214 can slide along it to the left side or the right side, for example, when turning to the right, refer to FIG.4. FIG. 4 is a schematic representation of the weighty drum slipping to the left due to the centrifugal force when the car turning to the right. Assume that the mass of the weighty drum is m, when accelerates to a speed of v_3, the momentum will be:

$$\text{Momentum} = mv_3 \qquad (3)$$

Since the left front tire has frictional force with the ground, the outward speed is nearly zero. But if the centrifugal force is too large, the frictional force is smaller than the centrifugal force, then the front tire will slip outward and forward. This will increase the turning radius, the momentum of slipping is $ft = Mv_4$, where f is the centrifugal force, t is the time of slipping, M is the mass of the car and v_4 is the average speed of slipping, then the momentum of slip is Mv_4. But if the weighty drum is sliding to the left side freely, due to no frictional force, its velocity v_3 is larger than the slipping velocity v_4 of the car, thus the momentum is transferred temporarily to the weighty drum, and the momentum $ft = mv_4$ is absorbed by the body when the weighty drum reaches the far left end, and an outward force $f = mv_4 / t$ is produced. This force produces a torque to assist the car to rotate toward the turning direction, and the front tire would not slip outward and forward, thus decreasing the radius of turning, and decreasing the wear of the tires. Also, the balance and safety of the driver and the car are improved. It also decreases tilting, so increases the comfortable of the passengers. When the turning is completed, the weighty drum 214 is blocked by the left end plate and the right end plate and momentum is released and transformed to a pushing force, but in this time, turning has been completed. This pushing is not important to the driver and the passengers. Now the weighty drum stops on the left end position, as shown in FIG.4. The left recovered spring 210 is compressed and potential energy is stored, but the right recovered spring 212 is still in its original position, since the recover springs do not connect with the weighty drum. Once turning is completed, the recover spring 210 will push the weighty drum to its original position, as shown in FIG.3. For a left turn, the weighty drum 214 will slide to the right. The operation is the reversal of FIG.4.

FIG.5 illustrates the example set up of the two braking buffer devices and one turning balance device under the body of a car. One of the braking buffer device 504 is installed between the right front tire 502 and the right rear tire 503 longitudinally. Another braking buffers device 504' is installed between the left front tire 502' and the left rear tire 503' longitudinally. The turning balance device 505 is installed behind and under the trunk transversely, as shown in FIG.5.

Although specific embodiments of the invention have been disclosed, it will be understood by those having skill in the art that minor changes can be made to the form and details of the specific embodiments disclosed herein, without departing from the spirit and the scope of the invention. The embodiments presented above are for purposes of example only and are not to be taken to limit the scope of the appended claims.